

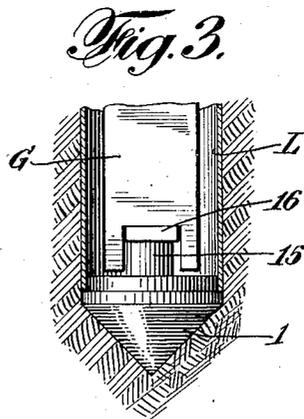
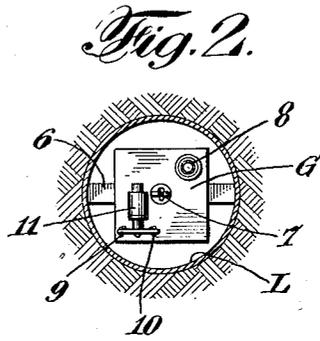
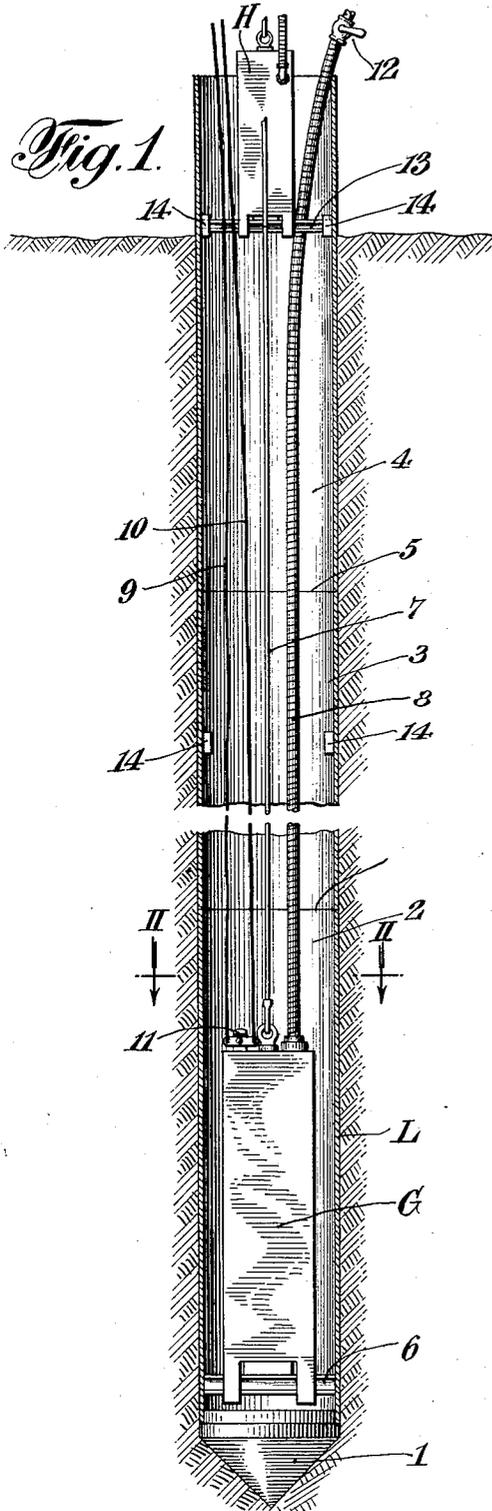
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M. BLUMENTHAL

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STEEL PILE SHELL

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INVENTOR.
Maurice Blumenthal
BY *L. Jessford Handy*
ATTORNEY

UNITED STATES PATENT OFFICE

MAURICE BLUMENTHAL, OF BROOKLYN, NEW YORK

STEEL PILE SHELL

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This invention relates to steel piles and means and method of sinking the same.

An object of the invention is to provide a pile which is strong and substantial and which may be readily sunk into the earth, which will include means serving both to reinforce its wall parts and to support a desired number of power hammers by which to sink it, which may be sunk by force applied at different selected points in its length, the principal force being applied at or near its lower end so that said force will exert a pulling strain upon the pile to move it into the earth.

A further object is to provide means for sinking the pile of a character to operate interiorly of the pile in engagement with the walls of the pile at any desired point in the length of the pile.

A further object is to provide an improved method for the sinking of piles according to which piles may be sunk more accurately and with less effort and noise than heretofore, and according to which the material forming the pile may be of less weight, and hence of less cost, than has been practical by methods now in use.

Other objects and aims of the invention, more or less specific than those referred to above, will be in part obvious and in part pointed out in the course of the following description of the elements, combinations, arrangements of parts and applications of principles constituting the invention; and the scope of protection contemplated will be indicated in the appended claims.

In the accompanying drawing which is to be taken as a part of this specification, and in which I have shown merely a preferred form of embodiment of the invention:—

Fig. 1 is a transverse sectional view of a pile constructed in accordance with this invention, the same being shown in the process of being sunk into the earth by the means and in accordance with the method proposed by this invention.

Fig. 2 is a transverse sectional view taken upon the plane of line II—II of Fig. 1, and

Fig. 3 is a fragmentary detail sectional view corresponding with the lower end por-

tion of Fig. 1 but illustrating a modified form thereof.

Referring to the drawing for describing in detail the structure illustrated therein, the reference character L indicates the pile shell. This is formed of sheet metal, being usually, though not necessarily, of cylindrical cross sectional contour and having a separately formed conical point as 1 at its lower end of the usual type to facilitate entry of the pile into the earth.

The entire length of the pile may be made up as a single integral tubular member if desired but where excessively long piles are to be used they may preferably be made of a plurality of separate sections as 2, 3 and 4 connected together by any appropriate means but preferably by being welded, as at the joints 5—5.

Within the pile, adjacent its lower end, that is adjacent the point 1, is arranged a cross bar 6 adapted to support a power hammer G. This cross bar may be connected with the opposite walls of the pile in any approved manner but it is preferably welded directly to the metal of said walls.

The hammer G rests upon the upper surface of the bar, and is preferably of such proportions relative to the diameter of the pile that it will be held by engagement with the pile against any such appreciable lateral or tilting movement as would interfere with its proper operative engagement with the bar, the blows of the hammer against the bar being thereby always directed substantially centrally along the axial line of the pile during the sinking operation, thus insuring as far as possible a straight line downward movement of the lower end of the pile, and hence of the entire pile, into the earth.

A suitable carrying line as 7, an air hose as 8 and a suitable control device, for instance the cables as 9 and 10 operating upon a valve mechanism as 11 on the hammer, extend from the hammer upwardly through the upper end of the pile wherewith the hammer may be manipulated and controlled from beyond the upper end of the pile at will.

In some instances the control device 9—10—11 may be displaced by the use of an

air control valve as 12 arranged in the air hose 8.

In order to facilitate the easy downward movement of the pile into the earth, particularly in instances where the length of the pile is excessive, one or more auxiliary power hammers as H may be arranged at appropriate points within the pile above the hammer G, such auxiliary hammers being supported upon auxiliary cross bars as 13, similar to the cross bar 6 and attached to the walls of the pile in the same manner.

In some cases it may be desirable to make the auxiliary cross bars 13 detachable and to this end the drawing suggests the use of pocket forming brackets as 14—14 fixed upon the pile wall of a character to detachably receive the opposite ends of the auxiliary cross bars. Any number of pairs of these brackets may be provided, and any one or more pairs may be utilized to support a cross bar for the operation of different auxiliary hammers at different points in the length of the pile as will be readily understood from an inspection of the drawing.

The hammering action of the auxiliary hammers will not only assist the upper portions of the pile downwardly under the pull of the main hammer G, but may be depended upon to impart a certain desired amount of vibratory movement to the side walls of the pile at the selected points where the hammers are applied, thereby to effect a material reduction in the skin friction between the outer surface of the pile and the surrounding earth.

The auxiliary hammers may be of the same size and power as the main hammer if desired or they may be of a somewhat smaller size and power in which event it is noted that they may be held in an inclined or tilted position if desired for imparting their blows at an angle against their supporting cross bars, and hence against the pile walls, to insure an excessive vibratory motion of a selected wall part when necessary.

After a pile has been sunk to a desired depth the hammers may be lifted out and the inside of the pile filled with concrete according to the usual practice.

If desired one of the hammers may be retained during the pouring in of the concrete, that is it may be positioned at a point above the level of the concrete, and utilized to impart such blows to the pile as will serve to vibrate the pile and thus cause the concrete to become more compact than would otherwise be the case. The hammer used for this purpose would be advanced step by step upwardly to different pairs of brackets 14, that is to different levels as the level of the concrete rises.

It will be seen that according to this invention the sinking of the pile is accomplished primarily by a force which is applied at the lower end of the pile tending to pull

the pile downwardly through the earth, and that the direction of force or pull, due to the fact that the hammer G is held by its relation to the pile walls always substantially in the axial line of the pile, is always along the axial line of the pile so that the tendency of movement of the lower end of the pile is always in a straight line axially of the pile. The upper portions of the pile will of course follow the lower or entering end, and hence the pile will be always inclined to follow a perfectly straight line during its movement into the earth.

In some cases it may be desired to withdraw the pile shell after the concrete has been poured, and to facilitate this operation it is suggested that, in addition to forming the point 1 easily detachable from the shell, the cross bar 6 may in such event be removably supported in pocket brackets as those indicated 14 above.

In any event the bars 6 and 13 may be considered as being parts of the driving device or hammers since they are in fact merely extensions of the hammers by which the hammer blows are transmitted to the walls of the pile.

In the modification Fig. 3 the structure is the same as already described except that in this case the conical point 1 is shown as being provided with an anvil portion 15 arranged to be engaged by the driving part 16 of the hammer, thus displacing the cross bar 6. The point 1 would in this case of course be welded directly to the lower end of the shell so that the driving force of the hammer imparted to the point 1 would operate to pull the shell with the point.

A particular and manifest advantage of applying force at the entering end of the pile, rather than at the following end as heretofore, resides in the fact that relatively less force is required to sink a pile of given proportions in earth of given quality. The force is applied almost directly at the point of application between the pile and the earth instead of being transmitted through the vibratory body of the shell. A relatively smaller size of hammer will accomplish the same movement of the pile as a relatively larger one applied against the upper edge of the pile.

As many changes could be made in this construction without departing from the scope of the invention as defined in the following claims, it is intended that all matter contained in the above description, or shown in the accompanying drawing, shall be interpreted as illustrative only and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A hollow pile shell intended to be sunk 130

into the earth, a plurality of hammer supports arranged within the shell extending transversely thereof spaced along the length of the interior of the shell each adapted to support a separate power hammer and to receive and to transmit to the shell the blows of the respective hammers, and a closure for the lower end of the shell constituting an entering point thereon.

2. A hollow pile shell intended to be sunk into the earth, a plurality of hammer supports arranged within the shell extending transversely thereof spaced along the length of the interior of the shell each adapted to support a separate power hammer and to receive and to transmit to the shell the blows of the respective hammers.

3. A hollow pile shell intended to be sunk into the earth, and a plurality of hammer supports arranged within the shell spaced apart along the length of the interior of the shell each adapted to support a separately operable power hammer within the shell and to receive and transmit to the shell the blows of the hammers supported thereby respectively.

4. The elements of claim 2, the lowest of said supports being permanently secured to the shell interiorly thereof and the other supports being detachably secured to said shell interiorly thereof, whereby said hammers may be removed from the interior of said shell upon the completion of said work of driving the latter preliminary to having said shell filled with concrete.

5. The elements of claim 2, and means whereby at least a portion of said hammer supports is detachably mounted so as to facilitate removal of one of the hammers from within the shell.

6. A hollow metallic pile shell intended to be sunk into the earth, said shell having opposite side walls and being provided interiorly adjacent its lower end with a cross bar extending between said opposite walls and secured by its opposite ends to said side walls adapted and intended to receive and support a power hammer for driving the shell into the earth, said side walls being of single thickness sheet metal adapted and intended to vibrate as the result of hammer blows struck the cross bar, the cross bar being continuous across the shell and being firmly attached by its opposite ends to the inner surface of said single thickness side walls so as to transmit its vibratory movement thereto, and the outer surface of said single thickness side walls being disposed for engaging against the surrounding earth.

In testimony whereof I affix my signature.

MAURICE BLUMENTHAL.